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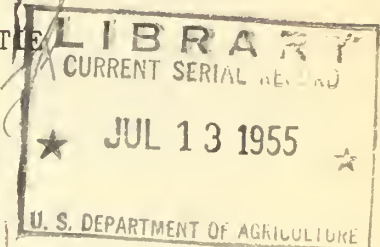
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UNITED STATES DEPARTMENT OF AGRICULTURE  
Agricultural Marketing Service

X TIMING OF SPRAYS TO CONTROL THE CIGARETTE BEETLE

Joseph N. Tenhet  
Stored-Tobacco Insects Laboratory, 1/  
Richmond, Virginia



Almost all flue-cured tobacco is aged for 2 or more years before manufacture, and during this period it is subject to attack by the tobacco moth and the cigarette beetle. About half of the flue-cured tobacco is stored in warehouses that, because of design or construction, are not adapted to effective fumigation. In such warehouses the insects are controlled by frequent applications of pyrethrum sprays or aerosols during the warmer months. These sprays or aerosols are highly effective in controlling the tobacco moth, because all the adults leave their hibernating places in the spring, or the tobacco in the summer, to mate and lay eggs. During this period, which lasts several days, the moths are in flight a good part of the time, and sprays or aerosols applied in the open spaces of the warehouses strike a large proportion of those present.

On the other hand, not all adults of the cigarette beetle leave the tobacco hogsheads, and consequently only a portion of them can be reached by sprays. Since the cigarette beetle causes damage of several million dollars to tobacco each year, it is urgent that the best possible control be obtained.

Previous workers have reported that the cigarette beetle is crepuscular, i.e., active only in subdued light. It has been noted that in closed warehouses, where the light is subdued all the time, the beetles tended to fly at selected periods other than at twilight, and that flight continued into the night. Since it is evident that spray or aerosol applications would be most effective during periods of greatest activity of the beetles, detailed studies were made in cooperation with a tobacco company at Durham, N. C., during 1954.

#### Procedure

Ten tobacco warehouses in a group were selected for the study. They were one-story structures with corrugated metal walls (fig. 1), only 2

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1/ This laboratory is one of the field stations of the Stored-Product Insects Section, Biological Sciences Branch, Marketing Research Division.

doors, and no windows. Each warehouse measured  $170 \times 140\frac{1}{2} \times 18$  feet, had a capacity of 433,000 cubic feet, and held 2,950 hogsheads of tobacco. The hogsheads were racked 3 tiers high on each side of a central aisle that led from one door to the other on opposite sides of each warehouse (fig.2). One standard suction-light insect trap, of the type commonly used throughout the tobacco industry, was suspended about 16 feet above the floor near the center of each warehouse.

Five of the warehouses were treated 6 times weekly with a pyrethrum aerosol, and the other 5 received no insecticidal treatment. During August, when cigarette beetle emergence and activity were at a peak, trap catches were recorded at 3-hour intervals from 2 a.m. until 11 p.m. When these records indicated that flight activity was largely confined to late afternoon and during the night, additional records were taken at hourly intervals from 2 p.m. until 2 a.m.

In order to determine the relationship between the time of cigarette beetle emergence from the hogsheads of tobacco and the period of greatest flight activity, two heavily infested hogsheads were placed in an insect-tight, cloth-covered cage in a closed warehouse. There were no lights in or near this cage. Strips of tanglefoot paper approximately 1 inch wide and 3 feet long were laid over the top of each hogshead. The strips were replaced every 3 hours, and the number of beetles caught was recorded.

## Results

The data presented here show that 90 percent of the flight activities of the cigarette beetle, as indicated by trap catches in 5 untreated tobacco warehouses, occurred between 2 p.m. and 2 a.m. As shown in table 1, 77 percent of the average catch of 230,576 beetles during the 12-hour period from 2 p.m. to 2 a.m. was taken between 5 and 11 p.m., and 60 percent between 6 and 10 p.m.

In the 5 warehouses treated daily during the late afternoon with a pyrethrum aerosol, the peak catches did not occur until about 8 p.m. The low catches prior to 8 p.m., as shown in table 2, reflect the degree of control by the aerosol. It is evident, however, that large numbers of beetles escaped the aerosol and were active after the period of the treatment.

The time of emergence from the hogsheads, as indicated by the beetles trapped in the tanglefoot, is presented in table 3. An average of 76 percent of the day's emergence occurred between 2 p.m. and 2 a.m., showing a close correlation with the flight activity in the undisturbed warehouses (table 1).

## Discussion

It has been observed that a large part of applications of pyrethrum sprays or aerosols for stored-tobacco insect control in tobacco-company warehouses are made in the period from 7 a.m. to 4 p.m., during the usual workday. In view of the information here presented, this would be a time of low flight activity of cigarette beetle adults, and this low activity is an important factor in the effectiveness of the treatments. Applications made during the period of greatest activity should result in substantially better control of this insect.

## Recommendations

It is recommended that periodical applications of pyrethrum sprays or aerosols for the control of stored-tobacco insects in tobacco warehouses be made between 6 p.m. and midnight to coincide with the period of greatest activity of the cigarette beetle.

Table 1.--Average number of cigarette beetles trapped each hour between 2 p.m. and 2 a.m. over a 5-day period in 5 untreated tobacco warehouses 1/

| Hour ending      | Beetles captured per trap |                  |
|------------------|---------------------------|------------------|
|                  | Number                    | Percent of total |
| 3 p.m.....       | 587                       | 0.2              |
| 4 p.m.....       | 788                       | 0.3              |
| 5 p.m.....       | 3,192                     | 1.4              |
| 6 p.m.....       | 18,330                    | 7.9 )            |
| 7 p.m.....       | 33,532                    | 14.5 )           |
| 8 p.m.....       | 45,112                    | 19.6 ) 77.5 } 60 |
| 9 p.m.....       | 32,098                    | 13.9 )           |
| 10 p.m.....      | 27,590                    | 12.0 )           |
| 11 p.m.....      | 22,065                    | 9.6 )            |
| 12 midnight..... | 16,570                    | 7.2              |
| 1 a.m.....       | 17,177                    | 7.5              |
| 2 a.m.....       | 13,535                    | 5.9              |
| Total.....       | 230,576                   |                  |

1/ Records shown from 2-7 p.m. are based on catches in 3 warehouses over a three-day period.



Table 2.-Comparison of flight activity as indicated by the number of beetles trapped in 5 untreated warehouses August 18-20, with those trapped in 5 aerosol-treated warehouses July 27-30, 1954

| <u>Untreated warehouses</u>       |                           |                  |
|-----------------------------------|---------------------------|------------------|
| Period of day                     | Beetles captured per trap |                  |
|                                   | Number                    | Percent of total |
| 8-11 a.m.....                     | 2,565                     | 1                |
| 11 a.m. - 2 p.m.....              | 3,367                     | 2                |
| 2-5 p.m.....                      | 39,998                    | 21 )             |
| 5-8 p.m.....                      | 59,968                    | 32 ) 90 ) 76 )   |
| 8-11 p.m.....                     | 43,429                    | 23 ) ) 69 ) 55   |
| 11 p.m. - 2 a.m.....              | 26,453                    | 14 )             |
| 2-5 a.m.....                      | 10,609                    | 6                |
| 5-8 a.m.....                      | 2,954                     | 1                |
| <u>Aerosol-treated warehouses</u> |                           |                  |
| 8-11 a.m.....                     | 421                       | 2                |
| 11 a.m. - 2 p.m.....              | 371                       | 2                |
| 2-5 p.m.....                      | 807                       | 4                |
| 5-8 p.m.....                      | 865                       | 4                |
| 8-11 p.m.....                     | 6,379                     | 31 )             |
| 11 p.m. - 2 a.m.....              | 7,048                     | 35 ) 83          |
| 2-5 a.m.....                      | 3,345                     | 17 )             |
| 5-8 a.m.....                      | 1,015                     | 5                |

Table 3.--Emergence of cigarette beetles from 2 heavily infested hogs-heads over two 3-day periods, August 3-6, 17-20, 1954, as indicated by the catch on tanglefoot strips

| Period of day        | Beetles captured |                  |
|----------------------|------------------|------------------|
|                      | Number           | Percent of total |
| 8-11 a.m.....        | 52               | 4                |
| 11 a.m. - 2 p.m..... | 65               | 6                |
| 2-5 p.m.....         | 156              | 14 )             |
| 5-8 p.m.....         | 352              | 31 ) 76 ) 65 )   |
| 8-11 p.m.....        | 230              | 20 ) ) 62 ) 51   |
| 11 p.m. - 2 a.m..... | 128              | 11 )             |
| 2-5 a.m.....         | 80               | 7                |
| 5-8 a.m.....         | 84               | 7                |
| Total                | 1,147            | 100              |



Figure 1.--View of the exterior of one of the warehouses used in the tests.



Figure 2.--View of interior of one of the warehouses.  
Note the location of the light trap.

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